

VIII. SEVERE WINTER STORMS

A SEVERE WINTER STORMS ANNEX OVERVIEW

Winter storms vary in size and intensity and may affect a small part of Montana or the entire state. Winter storms and blizzards follow a seasonal pattern that begins in late fall until early spring (October thru April). These storms will destroy property, kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rains, heavy snowfall or blizzards. Severe winter storms are one of Montana's greatest hazards. Blizzards are most commonly connected with blowing snow and low visibility. Despite the initial consequences, there are many residual effects such as agricultural considerations and potential flooding concerns.

B DESCRIPTION

Strong storms crossing the North Pacific sometimes slam into the coast from California to Washington. The vast Pacific provides an unlimited source of moisture for the storm. As the moisture rises into the mountains, heavy snow closes the mountain passes and can cause avalanches. The cold air from the north has to filter through mountain canyons into the basins and valleys to the south. If the cold air is deep enough, it can spill over the mountain ridge. As the air funnels through canyons and over ridges, wind speeds can reach 100 mph, damaging roofs and taking down power and telephone lines. Combining these winds with snow results in a blizzard.

Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. What constitutes extreme cold and its effect varies across different areas of the United States. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. In the north, below zero temperatures may be considered as "extreme cold." Long cold spells can cause rivers to freeze, disrupting shipping. Ice jams may form and lead to flooding.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Heavy snow can immobilize a region and paralyze a city, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. In the mountains, heavy snow can lead to avalanches. The cost of snow

removal, repairing damages, and loss of business can have large economic impacts on cities and towns.

C. HISTORICAL OCCURRENCE AND RESPONSE

Winter storms are not limited to specific region within the state. Historically winter storms occur from late fall to the middle of spring. These storms vary in intensity from mild to severe.

Winter storms have dropped several inches of wet snow causing a heavy buildup on trees and knocking them onto the power lines. Ice covered power lines, combined with high winds, snap utility poles causing widespread power outages affecting customers for many days until power is restored. These storms lead to road closures. State and local snow removal equipment is dedicated to snow removal from roadways and may take time before utility crews can access damaged lines. Severe snowstorms have an impact on tourism, young livestock, and oil well production, adversely influencing the economic activities of these industries.

Broken power poles, materials and wire usually become buried under snowdrifts or frozen to the ground. Remove the debris in these conditions increase cost up to five times more than normal conditions. Leaving debris until spring thaw causes liability and safety concerns due to snowmobilers, farmers, or hunters getting entangled in the debris.

On October 31, 2000, a severe winter storm hit eastern Montana. The Billings, National Weather Service (NWS) office issued a Blizzard Warning for Southeast Montana and the Glasgow NWS office issued a Winter Storm Warning for northeast Montana. This storm dropped 8 to 12 inches of heavy wet snow in Westby, Plentywood, Wibaux and Lindsay. Six inches of snow fell in Baker, Plevana, and Carlyle. This precipitation fell in the form of rain, which measured over 2 inches in the region, before changing to snowfall. Heavy snow and ice load knocked down power lines, broke power lines and poles, and closed roads with snow drifts up to six feet. The storm produced wind gusts of over 30 Mph wit wind chill temperatures reaching 35 degrees below zero. Seventy miles of downed power lines left over 6500 customers without power. Over 1100 power poles were destroyed and 180 mounted transformers were replaced.

At the request of the Governor, On December 6, 2000 President Clinton issued Presidential Disaster Declaration 1350-DR-MT for the State of Montana as a result of this severe winter storm damage to Carter, Fallon, Richland, Sheridan and Wibaux counties.

On April 8 and 9, 2001 a late winter storm dropped 12 to 18 inches of wet, heavy snow on parts of Big Horn and Rosebud Counties, much of it confined to the eastern part of the Crow Indian Reservation and the western part of the Northern Cheyenne Indian Reservation. The most significant impact was the loss of power to several

hundred residences caused by lines breaking from heavy snow and poles breaking off. Approximately 5,200 customers of the Yellowstone Valley Electric Co-op, Inc., and the Big Horn County Electric Co-op Inc., lost power. Some customers in Big Horn County were without power for nine days. The electric cooperatives impacted by the storm immediately began efforts to restore power. While the weather after the storm was fairly mild, the melting snow made it impossible to get to many areas without a caterpillar pulling the repair trucks in. Big Horn County Electric Co-op had to use mutual-aid agreements with other electric cooperatives and also hire contractors to assist in repairs. Most of the customers impacted in Bighorn and Yellowstone Counties are members of the Crow and Northern Cheyenne Indian Tribes on those two reservations. All of these homes use wells for water supply and were without potable water and sanitation facilities until the power was restored.

On April 2, 2001 the Governor of Montana directed the implementation of the State Emergency Plan in accordance with Section 401 of the Stafford Act and requested a State Disaster Declaration for the following affected jurisdictions: The Counties of Big Horn, Yellowstone, Flathead, and Lake. The Crow Indian Reservation was also requested.

On May 18, 2001, Governor Martz requested a major disaster declaration for the State of Montana as a result of the severe winter storm that began on April 2, 2001 and ended on April 9th.

On May 28, 2001, President Bush signed a major disaster declaration for Big Horn County and the Crow Indian Reservation. On April 2, 2001 the Governor of Montana directed the implementation of the State Emergency Plan in accordance with Section 401 of the Stafford Act and requested a State Disaster Declaration for the following affected jurisdictions: The Counties of Big Horn, Yellowstone, Flathead, and Lake. The Crow Indian Reservation was also requested.

D. PREDICTION RECURRENCE

Blizzards in the Great Plains and the North Central states are generally caused by deep or deepening low-pressure systems (3). The low-pressure systems, which cause blizzards usually, result from eastward migration of low-pressure systems from the lee side of the Rocky Mountains. The most favored position for low-pressure systems to originate that cause blizzards in North Dakota is either southern Alberta (Alberta lows) or southern Colorado (Colorado lows).

Only a small number of the lows migrating out of the formation area and crossing the state in winter develop into blizzards. About 39 Colorado lows move out onto the plains during the winter season, and in an average year, only two or three develop into blizzards somewhere in the plains or North Central States (3). About 42 Alberta lows develop during the blizzard season, but usually only two of them develop into storms intense enough to cause blizzards in North Dakota. The complexity of the blizzard

forecasting problem is easily understood when it is realized that it is trying to identify, which one out of every 20 lows, will develop into a blizzard.

State	Colorado Low	Alberta Low	Other	Total frequency of occurrence
Colorado	0	0	1	1
Illinois	2	0	1	3
Iowa	10	0	2	12
Kansas	4	0	2	6
Minnesota	8	3	3	14
Missouri	2	0	0	2
Montana	1	8	2	11
Nebraska	14	0	3	17
North Dakota	8	13	3	24
South Dakota	12	6	5	23
Wisconsin	6	0	2	8
Wyoming	2	0	0	2

Blizzards are not a frequent wintertime event in Montana, averaging only slightly more than one per winter season (Table 15). Contrary to popular belief of people not familiar with Montana, blizzard conditions seldom last more than a day or two and frequently only a few hours. Blizzards are dangerous storms, possibly second only to tornadoes and hurricanes, and they demand the respect of all who must deal with them. Blizzards occasionally strike suddenly, filling a previously calm air with snow driven by strong winds which reduce visibility from miles to feet in minutes.

Now, the advance warning of impending blizzards given by the National Weather Service has greatly lessened the chances of being surprised by a blizzard, or even being stranded in one, by those who observe the forecasts and warnings.

E. VULNERABILITY

The entire state of Montana is vulnerable to the effects of severe winter storms. Primary safety hazards are loss of power, road closures, and low hanging or downed power lines.

Loss of power can cause major disruption in water supplies and other critical facilities, such as wells, fire protection and medical facilities. At times, local officials have been forced to impose emergency water rationing. This restriction creates

hygiene problems, sanitation difficulties and seriously affects the fire department's response capability until power is restored.

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm. The leading cause of death during winter storms is from automobile or other transportation accidents. Exhaustion and heart attacks caused by overexertion are the two most likely causes of winter storm-related deaths. Elderly people account for the largest percentage of hypothermia victims. Many older Americans literally "freeze to death" in their own homes after being exposed to dangerously cold indoor temperatures, or are asphyxiated because of improper use of fuels such as charcoal briquettes, which produce carbon monoxide.

F. MITIGATION

By changing the orientation of ice accumulations on ariel conductors, the self-sustaining oscillation known as "galloping" can be eliminated. DES currently has a project in the Sidney area which, by applying this mitigation technique, will positively impact a significant area of Northeastern Montana which is dependent upon transmission lines subject to extreme wind, snow and ice and located in remote locations.

G. SUMMARY

In-migration of individuals from states and countries with less severe climate extremes and an aging population in much of our rural area represents a substantial hazard potential—particularly with the recent history of mild winters. Winter storms in this geographical area presents a major threat to individuals, animals and property, and can occur virtually any month of the year.

H. RECOMMENDATIONS: Recommendations for this Hazard are found in Annex X, Tab A., FEMA-DR-1385-MT Severe Winter Storm, Hazard Mitigation Survey Team Report, pages 14 through 18

I. REFERENCES

Montana's Take-Along Winter Survival Handbook, DES and Montana Department of Transportation brochure, October, 1999.